






Patterns of blunt force homicide in the West Metropole of the City of Cape Town, South Africa

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There is currently a lack of information regarding the prevalence of and characteristics associated with blunt force trauma related homicides in South Africa. Information relating to the patterns of blunt force trauma could assist in the development and implementation of interventions targeted at specific areas or individuals as well as direct future research towards areas in need of investigation. This study is a 5-year retrospective review of autopsy reports obtained from Salt River Mortuary (Cape Town, South Africa). The prevalence of blunt force trauma was considered for unnatural deaths with a focus on homicide. The patterns of homicidal blunt force trauma are also presented. A total of 15 519 autopsy cases was analysed. In 1198 (7.72%) of these cases, the cause of death was found to be blunt force trauma and 828 (5.32%) of these cases were classified as homicides. Approximately 11% of blunt force homicide cases occurred in combination with sharp and/or ballistic trauma. Men from poor socio-economic areas were shown to be most at risk of blunt force homicide in the City of Cape Town.

Significance:

- The prevalence of homicidal blunt force trauma in the Western Metropole of the City of Cape Town is comparable to other regions in South Africa.
- The vast majority of victims sustained injury to the head, highlighting the need for further research in cranial blunt force trauma.
- Interventions should target young men, particularly in low socio-economic regions.

Introduction

Globally, trauma is considered to be one of the most common forms of homicide and is frequently categorised into three main groups according to the mechanisms of trauma: blunt, sharp and ballistic. Extensive research on wound pathology has been conducted to better distinguish between trauma mechanisms in order to provide information pertaining to the weapon type so as to clarify the events surrounding death.^{1,2}

The wound morphology in blunt force trauma cases varies based on the weapon used, the force with which it was applied and the affected body region.^{1,3} Typically, fatal blunt force trauma injuries are a consequence of blows from fists and feet or a variety of blunt implements such as household hammers, wooden clubs or bats. Some cases of blunt force trauma may not lead to sudden death but rather death after a delayed period of days, weeks or months, in which case difficulties may arise in the determination of whether an individual can be held accountable.⁴

Violence is rife in South Africa. Homicide is the second highest contributor to unnatural deaths in the City of Cape Town.⁵⁻⁷ Previous research has suggested that the largest proportion of homicide deaths in Cape Town is caused by sharp force trauma and firearms; nevertheless, blunt force trauma forms a substantial portion of unnatural deaths.⁸

Literature on blunt force trauma tends to focus on age and sex of the injured, location of injuries, number of body regions involved, defence injuries, weapon, assailant–victim relationship, location of the crime scene and further toxicological analysis of the victims' tissues.⁹⁻¹² Nationally there is a dearth of centralised information pertaining to blunt force deaths, hence research is based on data gathered from a variety of resources such as police dockets, hospital records and autopsy reports. Information relating to the patterns of blunt force trauma could assist in the implementation of appropriate interventions targeted at specific areas or individuals. Additionally it can direct research toward aspects of blunt force trauma which are in need of investigation.

In South Africa, there is little information regarding the prevalence and characteristics associated with blunt force trauma related homicides. Therefore, the principal objective of this study was to determine the prevalence of blunt force trauma related deaths and homicides in the West Metropole of the City of Cape Town (Western Cape Province, South Africa). The secondary objective was to describe the characteristics associated with blunt force trauma related homicides in the West Metropole of the City of Cape Town.

Methods

The study is a 5-year retrospective review of autopsy reports obtained from Salt River Mortuary between 1 January 2010 and 31 December 2014. Salt River Mortuary is an M6 Academic Centre which processes more than 3000 cases a year. It services the West Metropole of the City of Cape Town which comprises the Western, Southern, Klipfontein and Mitchells Plain districts.¹³

The prevalence of blunt force trauma was considered for unnatural deaths with a focus on homicide as categorised by pathologists during autopsy. The inclusion criterion was blunt force trauma as the cause of death, as determined by the pathologist. Cases in which the death was not caused solely by blunt force trauma but also included aspects of sharp or ballistic trauma were classified as combination deaths. Cases in which blunt force trauma was train related or as a result of falling from a height or a pedestrian or motor vehicle accident were excluded.

In each case, the characteristic data were collected and recorded in a Microsoft Office Excel® 2013 (Microsoft, Redmond, WA, USA) database. Stata version 13.1 (StataCorp, College Station, TX, USA) was used to perform descriptive statistics to identify the presence of patterns and commonalities for each characteristic. Pearson's chi-squared tests were used to assess the association among groups of characteristics and determine if relative proportions were equal or followed a known distribution. Population data for the relevant drainage area were obtained from the City of Cape Town and based on 2011 census data compiled by StatsSA¹⁴.

Ethical approval for this study was obtained from the Human Research Ethics Committee of the Faculty of Health Sciences at the University of Cape Town (reference 313/2015).

Results and discussion

Prevalence of blunt force trauma related death

The prevalence of unnatural blunt force trauma death as well as blunt force trauma homicide in the West Metropole of the City of Cape Town from 2010 to 2014 can be seen in Table 1. There was no significant difference in the prevalence of blunt force trauma ($p=0.829$), nor blunt force trauma homicides ($p=0.209$) among the years. During the period of study, a total of 15 519 autopsies were performed at Salt River Medico-legal Mortuary – an average of 3104 cases per year. Of the total number of cases, 1198 (7.72%) cases had blunt force injuries noted as the cause of death, and of these cases 828 (5.32%) were classified as homicides. The mean prevalence over the 5-year period was 8.55/100 000 for blunt force trauma homicides.

Table 1: The prevalence of total blunt force trauma cases and blunt force trauma homicide cases at Salt River Mortuary from 2010 to 2014

Year	Total mortuary intake	Number of blunt force trauma cases (%)	Number of blunt force trauma homicides (%)
2010	2954	229 (7.75)	138 (4.67)
2011	2768	223 (8.06)	160 (5.78)
2012	2990	222 (7.42)	146 (4.88)
2013	3346	247 (7.38)	183 (5.47)
2014	3461	277 (8.00)	201 (5.81)
Mean	3104	240	166
Total	15 519	1198 (7.72)	828 (5.32)

Because of the lack of centralised data focusing on blunt force trauma homicides, it is difficult to make a comparison of these results to previous results in the country. Matzopolous⁵ reported from the 2003 National Injury Mortality Surveillance System database that 14% of homicides in South Africa were a result of blunt force trauma. This figure corresponds to approximately 6% of unnatural deaths, similar to the 5.32% reported here. A more recent study in 2014 in Pretoria (Gauteng, South Africa) similarly reported that 6.19% of unnatural deaths were caused by blunt force trauma.¹⁵ However, this figure is a snapshot of a single year and was based on an analysis of autopsy cases in which blood samples were taken for alcohol analysis and excluded cases in which samples for alcohol analysis were not collected. Internationally, blunt force trauma has been shown to account for 41%, 24%, 23% and 18% of homicides in India¹⁰, Sweden¹⁶, China¹⁷ and Norway¹², respectively. Henderson and colleagues¹⁸ also reported that approximately 26% of non-firearm homicides in London (England) were a result of blunt force trauma.

Age of victims

In the current study the mean age of the victims was 31 years, with a standard deviation of 12 years. The age of the victims is widely

distributed, ranging from 0 to 82 years, with the principal age group (39%) of victims of homicidal blunt force trauma being 20–29 years. The distribution of cases across age groups can be seen in Figure 1. The overall age distribution of the victims of blunt force trauma homicide is significantly different from the age distribution of the overall intake from Salt River Mortuary ($p<0.001$).

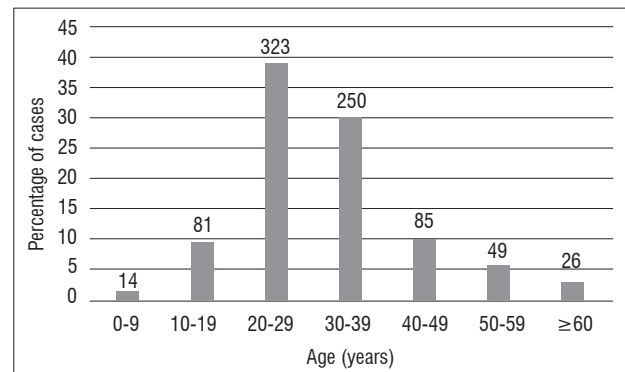


Figure 1: Percentage age distribution of victims of blunt force trauma homicide from 2010 to 2014.

The differences between the age distribution of blunt force trauma homicides and total mortuary intake are demonstrated in Table 2. The overall intake at Salt River Mortuary is primarily composed of cases of unnatural death with a small portion of natural death cases. The age groups 10–19 years, 20–29 years and 30–39 years were overrepresented with the age group 20–29 years being most at risk of blunt force homicide. The results of the current study are analogous with those from South Africa in 2003⁵ and 1994¹⁹ in which the age groups 25–29 and 25–34 years had the highest number of recorded homicides, respectively. The age group with the most blunt force homicide victims recorded in South African studies is slightly younger than those reported in British (30–39 years)¹⁸ and Indian (31–40 years)¹⁰ studies. This difference is possibly because of the involvement of younger people in gang activity and violence, as is often the case in the Western Cape.^{8,20,21}

Table 2: Comparison of the age distribution between blunt force homicide cases and the overall intake of Salt River Mortuary from 2010 to 2014

Age category (years)	Blunt force trauma homicide %	Salt River Mortuary intake %	Difference %	p-value
0–9	1.69	14.62	12.93	< 0.001
10–19	9.78	6.03	3.75	<0.001
20–29	39.01	23.69	15.32	<0.001
30–39	30.19	19.78	10.41	<0.001
40–49	10.27	12.82	2.01	0.0317
50–59	5.92	10.04	4.12	<0.001
≥ 60	3.14	13.02	9.88	<0.001

Sex of victims

Internationally and locally, male individuals account for a greater proportion of homicide victims than do female individuals.^{22,23} However, the reported proportions for homicides in South Africa are double the world average for male homicides.⁵ This is particularly evident for male individuals aged 15–45 years. The current study demonstrated that there were significantly more male victims than female victims of blunt force homicide between 2010 and 2014 ($p<0.001$). Overall, 90.22% of the victims were male and 9.78% were female, a ratio of 9.22:1. In

comparison, the reported ratio of male to female victims of blunt force homicide in the City of Cape Town during the year 1994 was 6.6:1, indicating an increase in fatalities of male individuals due to blunt force trauma.¹⁹ The male:female ratio for blunt force homicide found in India (6.6:1)¹⁰ and Scandinavian countries (2.3:1)¹² is substantially lower than that seen in the current study. The National Injury and Mortality Surveillance System reported the male to female ratio for all homicides in the city of Cape Town as 8.5:1 in 2003.⁵ The results of the current study show a significant overrepresentation of male victims of blunt force trauma homicide when compared to the overall intake at Salt River Mortuary ($p < 0.001$). This finding suggests that male individuals are more at risk of blunt force homicide than female individuals (Table 3). Clearly, South African men of working age behave in a manner that puts them at greater risk of violent injury than South African women, as well as men from other countries.

Table 3: Comparison of the sex distribution of blunt force trauma homicide cases with the overall intake of Salt River Mortuary from 2010 to 2014

Sex	Blunt force trauma homicide %	Salt River Mortuary intake %	Difference %	p-value
Male	90.22	76.95	13.27	<0.001
Female	9.78	23.05	13.27	<0.001

The explanation for this result is multifaceted and often based on complex socio-biological interactions including perceived masculinity and increased risk-taking behaviour amongst men.²⁴ In a South African context, three factors have been found to be important in the ideology of masculinity: toughness, control and sexuality.²⁵ A perceived idea of what it means to be a man results in displays of 'toughness' or 'bravery', thus disagreements are often resolved by arguments and subsequent fighting rather than by peaceful means.²⁶ This behaviour is further magnified by the presence of alcohol and substance abuse. It has also been reported that high levels of male unemployment and gender inequality within a community may be predictive factors for homicide and assault.²² The high levels of men involved in blunt force trauma, as well as homicide in general, in the West Metropole of the City of Cape Town may further be because of the high levels of gang violence in which men are usually more heavily involved than women, again as a consequence of poverty and a perceived ideology of masculinity.^{8,20}

Blood alcohol levels in victims

It is accepted that alcohol use and intoxication are key risk factors for homicide,²⁷ with Cape Town having a larger number of alcohol positive homicide cases compared to other areas in South Africa.⁵ The blood alcohol concentration (BAC) of victims of blunt force trauma was expressed in grams per 100 millilitres of blood (g/100 mL) and was classified according to four groups: not intoxicated (0 g/100 mL), mildly intoxicated (0–0.05 g/100 mL), intoxicated (0.05–0.15 g/100 mL) and severely intoxicated (0.15–0.4 g/100 mL). The distribution of BAC amongst victims can be seen in Figure 2. BAC was unknown for 354 (42.75%) cases because alcohol analysis was not requested.

Alcohol analysis was requested in 474 (57.25%) cases. From the cases for which alcohol analysis was performed, the majority of victims (66.67%) was not intoxicated. The 158 (33.33%) cases in which blood alcohol was detected, had a mean BAC of 0.169 g/100 mL in a range of 0.01–0.41 g/100 mL. In the 2014 study conducted in Pretoria, 38% of the blunt force trauma cases were victims who tested positive for blood alcohol with a mean BAC of 0.13 g/100 mL.¹⁵ It appears that the majority of victims of blunt force trauma in South Africa are not intoxicated; however, when alcohol is involved, victims tend to be on the higher end of the intoxication spectrum.

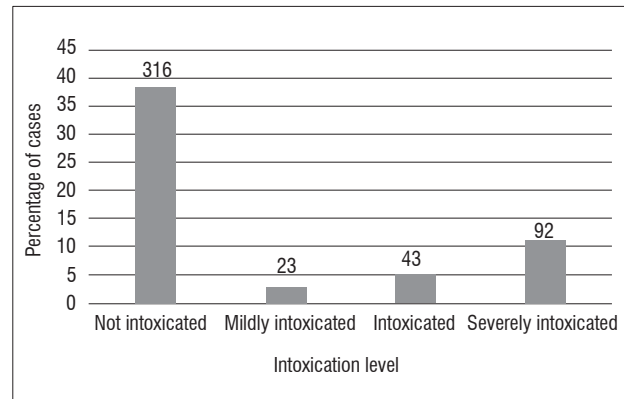


Figure 2: Percentage distribution of the blood alcohol concentration levels in victims of blunt force trauma.

A significant association was found between age and BAC ($p = 0.012$); the highest levels of intoxication being in the 20–29 years age category, with severe intoxication occurring more frequently than mild intoxication. Intoxication occurred within all age groups, excluding the 0–9 year age group. All intoxication levels were seen in both male and female victims. Because of the small number of female blunt force trauma victims in this study, it was difficult to make associations between female victims and alcohol use. However, the 17% of severely intoxicated females is lower than that found by Mathews et al.²⁸ in which 56% of female blunt force trauma victims in the Western Cape were severely intoxicated. Differences between these results could be because we included all ages and Mathews et al. excluded cases in which the victims were younger than 14 years old.

Day and month of death

An association was found between the distribution of blunt force homicide cases and the days of the week ($p < 0.001$). The highest number of blunt force homicides (23.67%) occurred on Sundays (Figure 3). The number of homicides that occurred during the weekend accounted for 40.82% of the total number of blunt force homicide cases. These results are similar to those of a 2003 study which reported that 49% of all homicides in Cape Town took place over the weekend.⁵ It is thought that this trend could be attributed to people spending more time taking part in social drinking over the weekend.¹⁸ Evidence of this pattern can be seen in Figure 4, which demonstrates that Sundays had the highest number of cases with mild to severe intoxication.

In addition to research suggesting a correlation between the homicide rate and days of the week, studies also often report a possible association between certain months or seasons of the year. In London it was found that the homicide rate increases during the warmer summer months¹⁸ which is contrary to the results produced in the current study which showed no recognisable pattern for the distribution of blunt force homicides over the course of the year from 2010 to 2014. A possible explanation for this may be the moderate climate in South Africa and much higher crime rate overall in comparison with Britain.¹⁹

Number and location of injuries

Injury profiles were similar for all years of the study. There was a high degree of variability in the severity of the blunt force attacks; the number of external injuries to the body ranged from 0 to 70 per case, with an average of 14 (± 12) injuries per case (Table 4). The cases in which no injuries were reported were indicative of cases in which no visible signs of blunt force trauma were present externally. Very high numbers of injuries were mostly in cases with extensive areas of abrasion. Information pertaining to the number of assailants and weapons used was not uniformly reported or available but cases showing multiple combination injuries are thought to be associated with multiple aggressors – often seen in cases of community assault particularly in the form of 'mob' or 'vigilante' justice, which is common in the Western Cape.^{8,29}

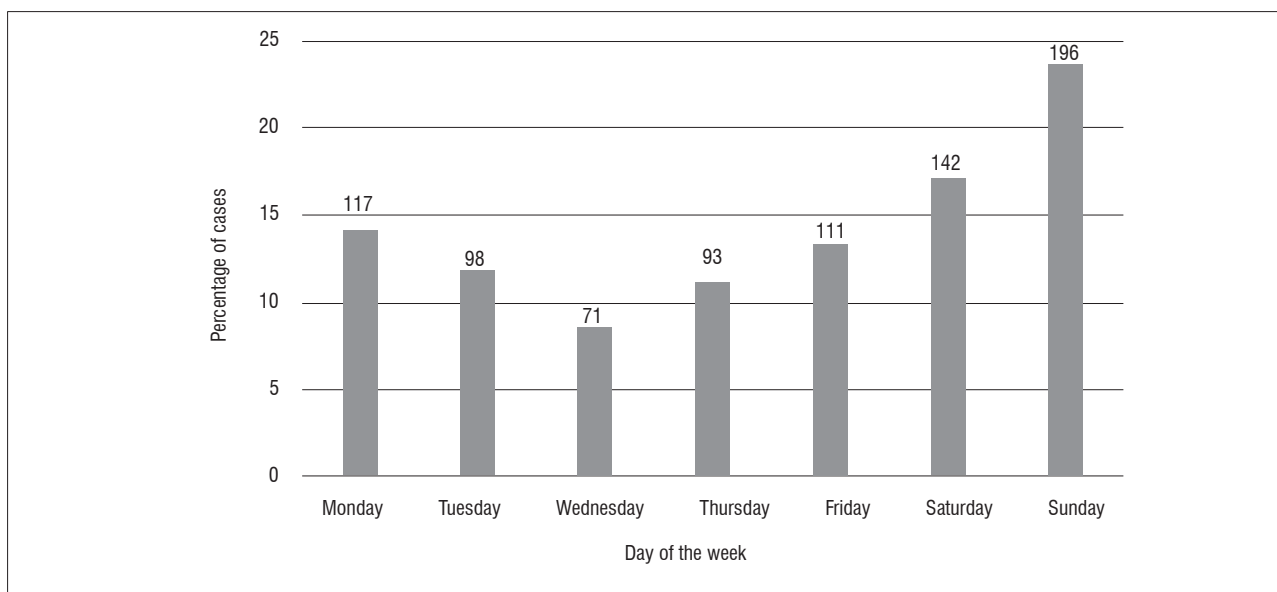


Figure 3: Percentage distribution of blunt force homicide cases from 2010 to 2014 across the days of the week.

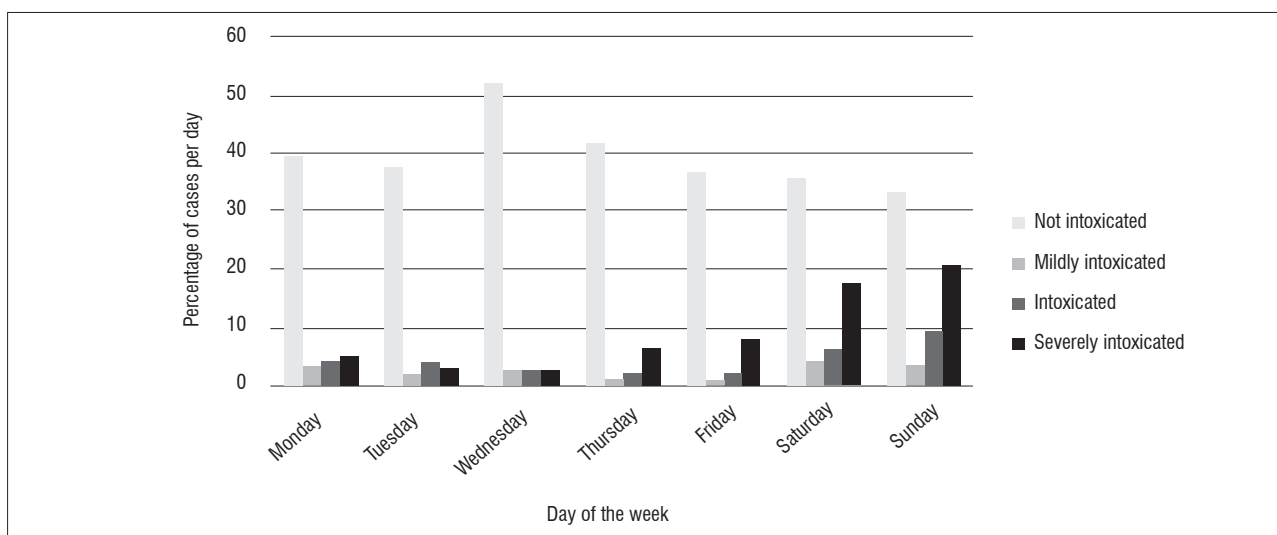


Figure 4: Percentage distribution of intoxication levels during the week as a percentage of the total blunt force trauma homicide cases per day from 2010 to 2014.

Table 4: Distribution of the number of external blunt force injuries per case from 2010 to 2014 and the regional distribution of the blunt force injuries

Number of cases	Number of injuries per case				Number of injuries per body region (%)						
	Mean	s.d.	Minimum	Maximum	Head	Neck	Chest	Back	Legs	Arms	Abdomen
828	14	12	0	70	772 (93%)	174 (21%)	328 (40%)	303 (37%)	441 (53%)	498 (60%)	168 (20%)

A total of 90 blunt force homicide cases (10.86%) were classified as combination deaths involving two or more trauma types. A recent study at Tygerberg Forensic Pathology Services, Cape Town found that almost half of the cases classified as community assault involved multiple trauma types with blunt force trauma forming the basis of the majority of injuries sustained.³⁰ Mob attacks have been described as vicious attacks and are often perpetrated by groups without discipline or membership to a particular cause or faction and are thus often heated and unstructured.⁸

It is therefore no surprise that victims of such 'justice' often bear injuries from multiple implements.

During the period of investigation, many victims sustained a high number of injuries, the location of which tended to be spread over the body. The head was the body region which most often (93%) showed signs of blunt force trauma (Table 4). Of these cases, 192 (23%) involved the head as the only injured body region whilst 580 (70%) involved injury to the head in addition to other regions (Figure 5).

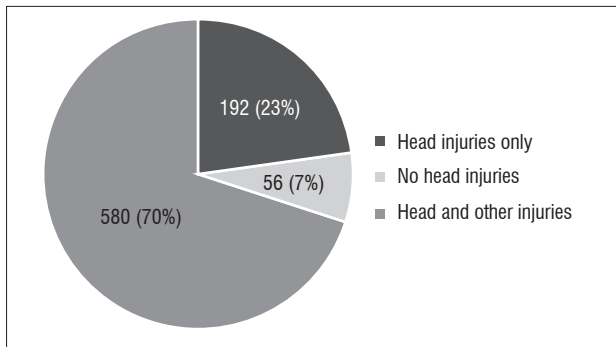


Figure 5: Proportion of head injuries in blunt force trauma homicides.

Defensive injuries could contribute to the large number of wounds located on the arms and legs and may account for these regions being the second and third most affected body regions, respectively, in blunt force attacks. The high number of cases involving the head echoes the findings of Ambade and Godbole¹⁰ who recorded 81% of cases of blunt force homicide involving the head. A more complete injury profile of blunt force attacks would be possible if hospital records (which provide injury information of victims who survive blunt force attacks) are combined with autopsy reports.

Crime scene locations

The West Metropole of the City of Cape Town comprises areas with varied socio-economic statuses. Poor socio-economic status has been shown to be correlated with high rates of homicide.^{22,31} The current study concurs with the finding of elevated levels of homicide in poor socio-economic areas. The physical location of the crime scene refers to the physical context of the crime scene and was categorised as indoors (in formal or informal housing), outdoors and unknown. There was no significant difference in the distribution of the physical crime scene locations of blunt force homicides across the years ($p=0.421$). As seen in Figure 6, a significant proportion of victims (43%) was killed in an outdoor context, compared to those killed at other locations ($p<0.001$).

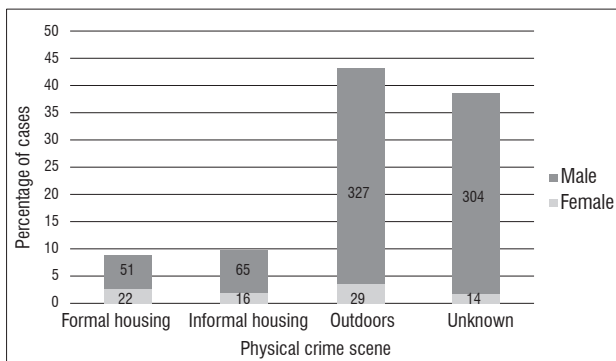


Figure 6: Percentage distribution of total number of victims and sex distribution in physical crime scene locations.

Although there was a much higher number of male than female victims, when the number of cases per physical crime scene location was analysed separately for each gender, a difference in the proportional distribution of female and male victims was noted. A significantly greater proportion of female victims (46.91%) were killed indoors in formal or informal housing compared with male victims (15.53%) ($p<0.001$). These results correspond to those of previous English and South African studies which concluded that a greater percentage of women than men are killed in their domiciles.^{5,18} A reason put forward for this global trend is the difference in the interaction of socio-biological factors and gender roles within society, leading to men being more likely than women to interact aggressively, especially with strangers away from their homes.²⁴ From a South African perspective, it has been reported that more than half of all female homicide victims in South Africa are

killed by an intimate partner (that is, a current or former boyfriend/husband/same sex partner or rejected lover) indoors.³² Furthermore, homicide perpetrated by an intimate partner often results in blunt force injuries.³³ Considering these factors, it is not surprising that we found that the majority of female victims in the current study was murdered within formal or informal housing.

Conclusion

The current study highlights the prevalence of homicidal blunt force trauma in Cape Town and provides insights into the patterns associated with victims of such crimes. A paucity of literature surrounding this topic exists. However, the results of the current study broadly concur with previous studies undertaken in South Africa but provide a more detailed analysis of blunt force injuries in cases of homicide. In the West Metropole of the City of Cape Town, the prevalence of blunt force trauma homicide between 2010 and 2014 was 5.32%. Young men from areas of poor socio-economic status comprised the majority of the victims. Interventions, especially those that target young men, may be needed for these areas. There was a high number of injuries associated with blunt force homicides located on the head, highlighting the importance of focusing resources and research on cranial trauma. Future research should attempt to obtain a more complete injury profile of blunt force trauma by including the investigation of non-fatal blunt force trauma.

Authors' contributions

C.C. was the lead author, collected and analysed the data, and wrote the first draft. C.G.M. supervised the study, conceptualised and designed the project, and assisted with data analysis. M.H. supervised the study and contributed conceptually. All authors contributed to drafting the article and approved the final version.

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